

A MULTI-FACTORIAL SUSTAINABILITY ASSESSMENT OF FIVE EUROPEAN AGROFORESTRY FARMS

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Abstract

Within the European project SustainFARM researchers from five countries (Denmark, UK, Italy, Poland, Romania) have adapted an established sustainability assessment to allow for its application within a range of agroforestry systems. The Public Goods Tool assesses the agriculture-related “public goods” that are provided by a farm, covering a number of ‘spurs’ or dimensions of sustainability. Results from an initial pilot assessment of seven agroforestry farms from the five countries with the updated tool have revealed that it can provide a useful learning framework; however further improvements are needed to capture the future aspirations of the farm-manger and introducing a weighting factor to account for region/system specificity. The results from the assessment itself have also revealed the benefits that diverse agroforestry systems can provide across a range of sustainability criteria. Future research in this area will investigate the potential for adapting the PGT to allow for self-assessments.

Keywords: public goods; silvopastoral; silvoarable; olives; alley cropping

Introduction

In recent years there has been a growing interest in the development and application of sustainability assessment tools within agriculture. As a result a number of approaches have been established to provide an overview of farm performance against a range of environmental, economic and social criteria and to identify trade-offs between multiple dimensions. Despite considerable developments in this area, few tools address the sustainability of agroforestry systems, with most approaches focusing on the sustainability of agricultural products (crops, meat, dairy), or occasionally forestry/other non-food products in isolation, rather than in combined systems.

Within the European project SustainFARM (FACCE-JPI www.sustainfarm.eu) a group of researchers from five countries (Denmark, UK, Italy, Poland, Romania) have therefore adapted an established sustainability assessment to allow for its application within a range of agroforestry systems (willow and hazel alley cropping systems, olive silvopastoral system, wooded pasture, intercropped orchard), to identify areas of stronger/weaker performance and to seek feedback on the assessment process.

Materials and methods

The Public Goods Tool (PGT) provided the framework for the analysis. The PGT was originally developed by the Organic Research Centre in 2011 and has been updated within recent projects such as Sustainable Organic and Low Input Dairying (SOLID), Towards Eco-energetic Communities (TWECOM) and a recent PhD that compared the performance of a range of tools (Gerrard et al. 2012; Marchand et al. 2014).

The PGT assesses the agriculture-related “public goods” that are provided by a farm. A number of ‘spurs’ or dimensions of sustainability are covered. These dimensions include soil management, agri-environmental management, landscape and heritage, water management, fertiliser management and nutrients, energy and carbon, food security, agricultural systems diversity, social capital, farm business resilience, animal health and welfare management and governance. Each spur is assessed on a 1-5 scale by asking questions to farmers based on a number of key “activities”. Each activity has at least one corresponding question, mostly about farm management practices, and these allow a researcher or advisor to evaluate the detailed ways in which the farm provides each public good. The choice of activities to be included was influenced by a desire for the data collected to be of a type that a farmer would already have in their farm records, i.e. not requiring any further surveys to be carried out. The PGT assessment takes two to four hours to complete, depending on the size and complexity of the farm.

Within the SustainFARM project, a new version of the PGT was produced through the incorporation of assessment criteria with particular relevance to studied agroforestry systems (Table 1). Individual criteria and their associated indicators were identified through a comprehensive literature review carried out in the summer of 2016. In a second stage of work the new assessment criteria identified through the review were subjected to a series of online surveys and workshops with national stakeholders from Denmark, Italy, Poland, Romania and the UK. The workshops aimed to identify the criteria and indicators that were the most “appropriate” for an assessment of agroforestry systems in Europe, with “appropriateness” defined in terms of each indicator’s relevance, comprehensiveness, interpretability, data quality, efficiency and the degree of overlap with existing criteria within the PGT. Through this process the list of 91 indicators was narrowed down to around 50. The narrowed down list was incorporated within the PGT to produce a new version of the tool for the SustainFARM project, and assessments carried out on seven agroforestry farms (Table 1).

Table 1: Agroforestry farms within the study (numbers corresponding to the figure below).

| No. | Agroforestry farm | Study location | Size |
|-----|---|-------------------------------|--------|
| 1 | Organic farm: hazel and willow alley cropping systems, mixed species timber and apple system, hedgerows | Wakelyns Farm, Suffolk, UK | 22 ha |
| 2 | Experimental farm: alley cropping system (willow and cereals) | Taastrup, Denmark | 11 ha |
| 3 | Organic farm with intercropped orchard with vegetables and forest | Opolskie Voivodship, Poland | 45 ha |
| 4 | Livestock farm with wooded grasslands and forest | Beskin Mountains, Poland | 200 ha |
| 5 | Organic farm: olive orchard with natural weed between the tree rows, fruit orchard and forest | Orvieto Municipality, Italy | 7 ha |
| 6 | Conventional farm, of which 22 ha are managed as olive orchards with periodical soil harrowing | Orvieto Municipality, Italy | 207 ha |
| 7 | Livestock silvopastoral system with wooded grasslands | Petrova Municipality, Romania | 94 ha |

Results and discussion

The results from the PGT assessment of studied agroforestry farms are provided in Figure 1 below.

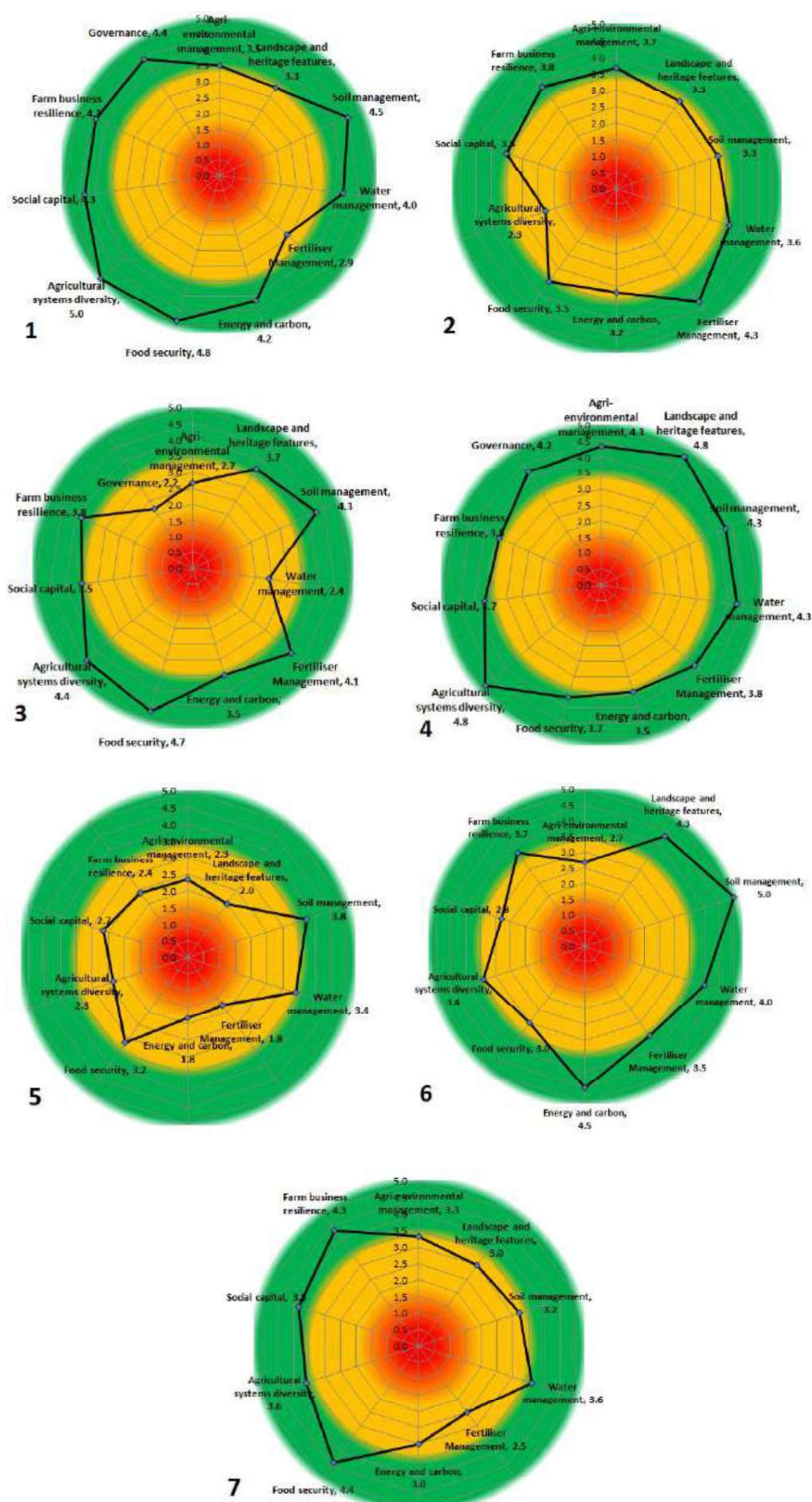


Figure 1: PGT assessment results for SustainFARM agroforestry farms (explanations of the numbers in the table 1).

The PGT assessment revealed diversified range of scores across most of the 11 spurs (Figure 1). Farms Business Resilience, Social Capital, Systems diversity, Food Security, and Soil Management were particularly strong areas as a result of the diversity in marketing outlets, the high species / varietal diversity, importance of the farm for social involvement, local sales and a range of measures for enhanced soil protection. Weaker areas of performance were fertiliser

management and agri-environmental management due to an absence of written plans for nutrient/water management and conservation.

Feedback on the assessment process itself highlighted the potential issue of weighting of scores (the PGT was developed for a wide range of systems and the questions and scores are not tailored to a particular system or approach). It was highlighted that adjusting scores in accordance with the challenges faced by a particular farm-type or region is likely to lead to different outcomes and could make the assessment process more meaningful and useful for the farmers being assessed. Feedback also highlighted the issue of future development of the farm, an area which was overlooked within the assessment.

There are always areas where improvements can be made, most notably an absence of written plans/records, third-party certification and nutrient planning led to lower scores in some areas (e.g. energy and carbon management, agro-environmental or fertiliser management). Such assessment criteria focus on processes, rather than outcomes (a necessity of the assessment approach) and a more detailed and outcome oriented approach is likely to lead to a more precise evaluation of performance in these and other areas covered by the PGT (Schader et al. 2014).

Conclusion

The SustainFARM project team have developed an existing sustainability assessment framework for application in a range of agroforestry systems in Europe. Results from an initial pilot assessment with the updated tool have revealed that it can provide a useful learning framework; however improvements should be implemented with regard to capturing the future aspirations of the farm-manger and introducing a weighting factor to account for region/system specificity. The results from the assessment itself have also revealed the benefits that diverse agroforestry systems can provide across a range of sustainability criteria. Future research in this area will investigate the potential for adapting the PGT to allow for self-assessments. This will potentially allow for a greater number of assessments and for benchmarking of individual scores and assessment criteria.

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